Arizona Department of Health Services
Heat Emergency Response Plan

May 2006

1.0 Goals of Plan:

- Limit the adverse public health effects from excessive heat
- Identify conditions that would warrant activation of the Heat Emergency Response Plan
- Provide a framework for coordinating the efforts of the Arizona Department of Health Services (ADHS) Divisions, county, city and other agencies that provide services to the homeless, seniors and medically-at-risk persons, to reduce the health risks associated with extreme hot weather

2.0 Scope:

The ADHS Division of Public Health Preparedness, Division of Behavioral Health Services, Division of Licensing, Maricopa County Department of Emergency Management and City of Phoenix Emergency Management Office have been working together to establish a statewide Heat Emergency Response Plan to identify the roles and responsibilities of the state, county, city and other responsible agencies; and to establish a response upon the issuing of heat warnings. This plan serves as an incident annex to the ADHS Emergency Response Plan but does not take into account any power outages associated with an excessive heat wave. (Please refer to the ADHS Power Outage plan) The Arizona Division of Emergency Management (ADEM) would respond if needed, according to the Basic Plan of the State Emergency Response and Recovery Plan. (SERRP) http://www.dem.state.az.us/

This Plan will focus on following:

- Education to the public on the significance of a heat advisory, excessive heat watch and excessive heat warning
- Information of available resources for special needs populations
- Protection to vulnerable segments of the population during periods of excessive heat warning.
- Appropriate interventions, as necessary.

3.0 Background:

Exposure to excessive heat can cause illness, injury and death. Nationwide, approximately 400 people die each year from direct exposure to heat due to weather conditions. Many more people die from health conditions that are exacerbated by exposure to excess heat. The elderly, the very young, and people with chronic health problems are most at risk.[1] However, even young and healthy individuals can succumb to heat if they participate in strenuous physical activities during hot weather. Additionally, some behaviors also put people at greater risk: drinking alcohol; taking part in strenuous outdoor physical activities in hot weather; and taking medications that impair the body's ability to regulate its temperature or that inhibit perspiration.

1. http://www.bt.cdc.gov/disasters/extremeheat/program.asp

In the summer of 2005, a prolonged heat wave resulted in the deaths of several people in the Phoenix metropolitan area. By recognizing a heat wave in its developmental stages, counties,

cities and other agencies can take actions that will enable the public to prevent a heat related illness or death.

3.1 National Weather Services (NWS) Heat-related Messages

The Phoenix office of the National Weather Service (NWS) issues three types of heat-related messages.

1. **Heat Advisory –** issued when the temperature is forecast to be unusually hot but not life-threatening

2. **Excessive Heat Watch –** issued when conditions are likely to result in a life-threatening heat emergency within the next 24 to 48 hours.

3. **Excessive Heat Warning –** issued when a life-threatening heat emergency exists or is imminent.

These bulletins are based on four factors – temperature, humidity, amount of cloudiness, and the expected duration of these conditions. The combination of factors that will trigger one of these heat-related messages varies according to the time of year. These warnings may be issued for a single county or a larger portion of the state.

4.0 Concept of Operations:

As an agency that receives federal funding, the Arizona Department of Health Services (ADHS) must incorporate elements of the National Incident Management System (NIMS) into its emergency response plans. The Department's incident command structure, the Public Health Incident Management System (PHIMS) is NIMS compliant. (See Appendix A) Although daily planning and issues are handled by various Department programs, the PHIMS response is undertaken when a public health emergency arises. PHIMS is a modular structure in that it can expand or contract depending upon the needs of the emergency. For this response plan, not all elements of the PHIMS structure may need to be activated at once. However, if necessary, the ADHS Director may recommend the declaration of a statewide emergency to the Governor and the scope of PHIMS activation may increase.

The activities in this plan are based on the heat-related message categories from the National Weather Service (NWS) and the specific instruction from the PHIMS Incident Commander.

1. **Heat Advisory**

   Incident Commander

   - Notifies the Behavioral Health Branch Director (DBHS Division Chief for Compliance – (602) 364-4670)
   - Makes recommendations to counties to review and update their heat emergency response plans (see section 4.2)
   - Makes recommendations to counties to notify cities, towns and other agencies regarding emergency actions for special healthcare needs populations.

   Command Staff/Public Information Officer

- Drafts heat health alert messages for the public
- Updates scripts for English/Spanish messages on the 24-Hr. ADHS information line (602) 364-4500 or (800) 314-9243

Operations/EDC Branch Director

- Notifies the Department of Education and the year-round schools in Arizona of the heat advisory and they will be encouraged to limit outdoor activities for students.

Operations/Behavioral Health Branch

- Notifies affected Tribal Regional Behavioral Health Authorities/Regional Behavioral Health Authorities (T/RBHAs) that an heat advisory bulletin has been issued.
- Disseminates the information on the ADHS 24-hour information line, available resources and public health information via e-mail to the affected T/RBHAs.

Operations/Licensing Services Group

- Identifies licensed facilities by type (e.g. behavioral health, assisted living, long-term care) in affected area(s) to target communication with those facilities or identify potential intake locations in the event that there is inadequate cooling for individuals.
- Provides technical assistance to licensed providers by answering questions about licensing requirements, identifying nearby or unaffected facilities for emergency transfers, and passing on public health information.

Logistics/Communications

- Sends heat and other health alerts to various groups (healthcare providers, health officers, local health departments, stakeholders) via the Health Alert Network (HAN) and to hospital emergency departments statewide via the EMSystem.
- Works with the Arizona Department of Administration (DOA) to load updated messages to the ADHS 24-hour information line.

2. <u>Excessive Heat Watch</u>

In addition to above activities:

Operations/Incident Commander

- Notifies local health and emergency management departments to implement their heat emergency response plans

Operations/Behavioral Health Branch

- Notifies affected T/RBHAs to increase outreach efforts and contact outreach teams as applicable.
- Informs T/RBHAs that conditions are likely to result in a life–threatening heat emergency within the next 24 to 48 hours.
  In turn, T/RBHAs and providers will:
  - Activate their agency's Heat Emergency Response plan and increase surveillance efforts pertaining to heat-related deaths and injuries.
  - Post and distribute heat warnings and guidance materials at all clinics and service provider locations.

3. **Excessive Heat Warning**

In addition to above activities:

Operations/Incident Commander

- Notifies local health and emergency management departments to implement their heat emergency response plans and increase surveillance for heat related illness.
- May consider opening the Health Emergency Operations Center (HEOC)

Operations/Behavioral Health Branch

- Notifies affected T/RBHAs to initiate outreach efforts and utilize available clinic staff to assist with communication and welfare checks for vulnerable populations and clients who may be at risk of severe health impacts due to extreme heat.
- Works in conjunction with local providers to advise area hospitals of the excessive heat warning and urge them to consider the extreme weather conditions when discharging patients.
- Coordinates with local health and emergency management departments, Red Cross, Salvation Army and others to have T/RBHAs and trained Crisis Intervention Specialists, if needed, provide behavioral health screening, coordination and crisis counseling at cooling stations, hydration centers, emergency shelters or other locations established by the city or county as a result of the emergency.
- The Behavioral Health Group, T/RBHA staff and the Licensing Services group will immediately coordinate when there are any reports of a facility licensed by ADHS (including behavioral health and supervisory care homes) exceeding temperatures or experiencing air conditioning operational issues. T/RBHA will assist in relocation of residents if needed.

Operations/Licensing Services Group

- The Licensing Services group will serve in any capacity necessary to assist consumers and providers of health care and child care in licensed facilities during a response to extreme heat.

4.1 Education Campaign:

The ADHS heat emergency education campaign will be coordinated with the education campaigns of the National Weather Service, counties, Regional Behavioral Health Authorities (RBHAs), Tribal Regional Behavioral Health Authorities (TRBHAs) and other volunteer organizations throughout the State The Incident Commander and the Public Information Officer will work with the Epidemiology and Disease Control (EDC) Branch Director, Behavioral Health Branch Director and Hospital and Healthcare Branch Director to draft and release English and Spanish messages for electronic, written and media outlets such as the statewide AZ 211 system http://www.az211.gov/ in advance of excessive hot temperatures. The AZ 211 system provides on-line resource information to the citizens of Arizona and is an effective venue for heat-related emergency alerts and bulletins.

The Environmental Group and Behavioral Health Branch will create a brochure containing frequently asked questions (FAQ) on health information and taking necessary precautions during a heat wave. This and other materials will emphasize what portion of the population is at risk, how to recognize and prevent heat stroke, and the importance of receiving a minimum of two to

four hours of cooling per day during periods of heat. Additional information will include the need to look out for neighbors and older adults, heat-related risks to family pets, medication-associated risks and where to call for assistance.

The brochure and educational materials will be distributed to the RBHAs and providers including medical clinics and Projects for Assistance in Transition from Homelessness (PATH) outreach teams to be distributed among the homeless and other at risk populations.
ADHS will also encourage jurisdictions to create local heat related resource cards listing information such as locations of water stations, cooling stations and agencies providing extended hours of medical and shelter services for the homeless population and who to contact for "well watch" services.

4.2 Recommendations for County Heat Emergency Response Plans

In addition to listing activities in accordance with each of the three National Weather Service warnings, the following components are recommended to be part of a county heat emergency response plan:

- Declaring a local emergency
- Notification protocol
- County EOC activation
- Education campaign
- Information distribution systems and methods
- Use of volunteers
- Roles and responsibilities of county departments

Please see Appendix E for an example of a county heat emergency response plan.

4.3 Tribal Regional Behavioral Health Authority (TRBHA) and Regional Behavioral Health Authority (RBHA) Heat Emergency Response Plans:

All TRBHAs and RBHAs will be required to develop their own agency heat emergency response plans to incorporate specific regional activities that will be undertaken in a heat emergency. The T/RBHA heat emergency response plans are due to ADHS/DBHS annually and should address the following:

- Homeless outreach activities and information published through media press releases or distributed to contracted providers.
- Outreach and home visits to elderly, individuals with a serious mental illness, homeless, medically frail and/or shut-ins T/RBHAs should develop a list of individuals who may be at risk, prior to the alert.
- Consider extended work hours and prepare for individuals spending extended hours at facilities to avoid heat.
- Develop transportation plans as a part of the heat emergency response plan, including plans to transport individuals who have increased risk and are unable to access public transportation to T/RBHA appointments or to pick up medications.

- Provide crisis mobile teams and other outreach teams working in the community (e.g. ACT, PATH, etc.) with additional water and information on local resources.
- Display information in agency lobbies and develop distribution mechanisms for materials addressing individual protection and appropriate measures to follow during extreme heat.
- Publicize heat emergency response plans at T/RBHA Community Forums, newsletters, etc.
- Provide training on recognizing symptoms and providing first aid for heat related illness.

4.4 Behavioral Health Services Group Inter-agency Coordination:

The Behavioral Health Services Group will coordinate with the following divisions and agencies in the implementation of this plan.

- Division of Public Health Preparedness Line
- Public Information Office
- T\RBHAs
- Projects for Assistance in Transition from Homelessness (PATH) and other Outreach Teams
- Local Cities and counties
- Other agencies, including:
    - Community Information and Referral Services
    - Homeless Shelters
    - Area Agency's on Aging
    - Parks, Forestry and Recreation Departments
    - HIV Care Directions and other HIV/AIDS advocacy groups
    - HUD and USDA Rural Development (formerly Farmers' Home Administration)

4.5 Plan Maintenance:

It is the responsibility of the ADHS Heat Emergency Response Plan committee to ensure that the plan is reviewed and updated on an annual basis. The debriefing and review will consist of:

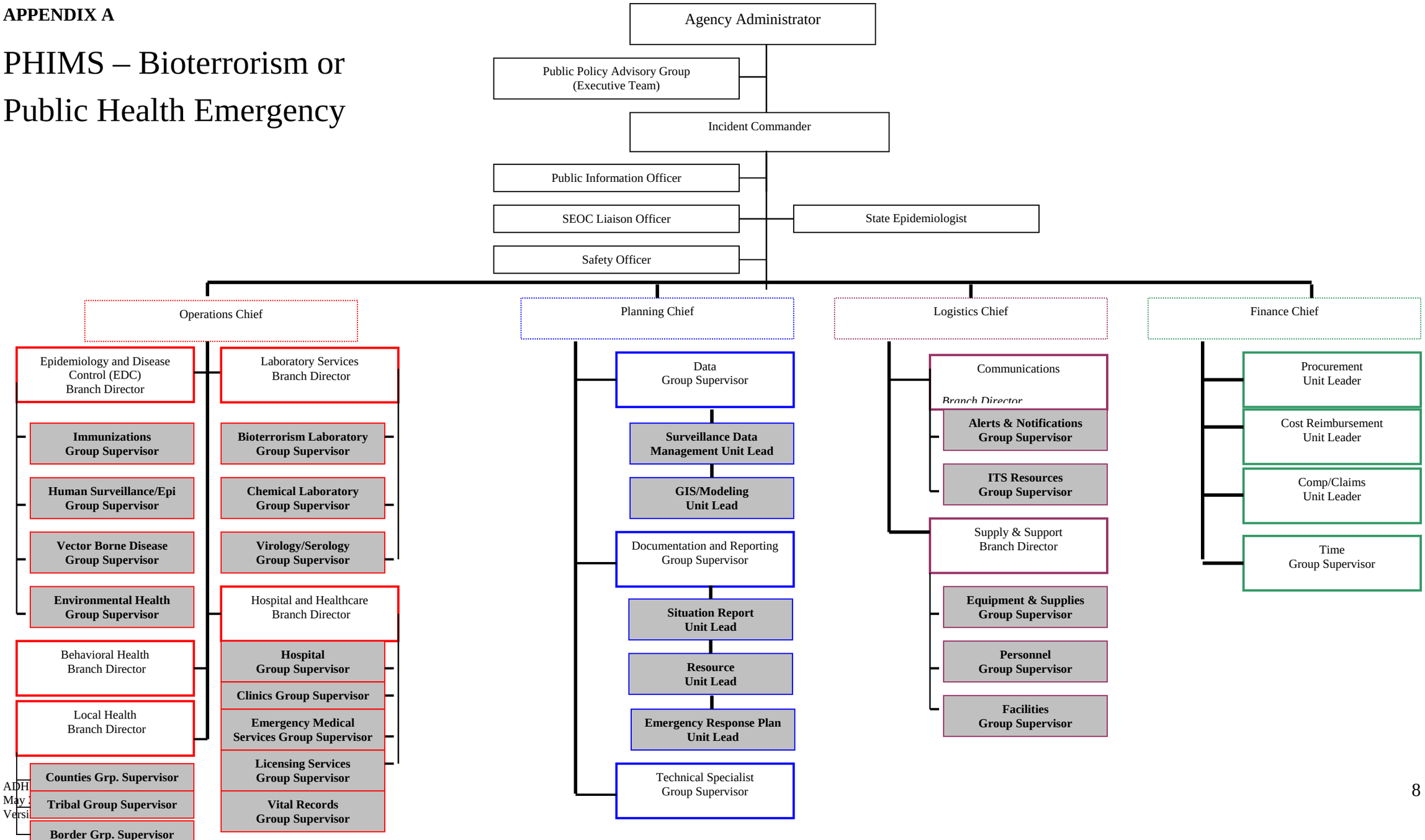
- Reviewing plan implementation, coordination and activation of what worked and which of the above action steps require further refinement.
- Establishing an on-going core team of emergency contacts or their designees.
- Identifying all agencies contacted and any additional steps needed from their perspective.
- Making necessary changes to the protocol based on information gathered and available resources.
- Evaluating responses and developing recommendations for improvement in subsequent years.

5.0 Appendices:

A. Public Health Incident Management System (PHIMS) Organization Chart
B. Contact Information
C. Press Releases from 2005
D. CDC – Frequently Asked Questions (FAQ) About Extreme Heat
E. Maricopa County Emergency Operations Plan – Annex K, Excessive Heat Emergencies
F. Heat Related Illnesses and Safety
G. Wet Globe Temperatures and Heat Index Guidelines/Chart
H. Other Resources

APPENDIX A

PHIMS – Bioterrorism or Public Health Emergency



APPENDIX B

Contact Information

ADHS Division of Behavioral Health

- **ADHS/PHS Contact: Compliance Division Chief (602) 364-4670**
- Deputy Director (602) 364-4566
- Assistant Deputy Director (602) 364-4567
- Clinical and Recovery Services Division Chief (602) 364-4626
- Housing Coordinator (602) 364-4602

ADHS Division of Licensing

- Office of the Assistant Director (602) 364-3064
- Assisted Living Licensing (602) 364-2639 (ask for Surveyor of the Day)
- Office of Behavioral Health Licensure (602) 364-2595

APPENDIX C

Press Releases from 2005

Release: **Staying Healthy In Arizona's Deadly Summer Heat**

Release Date: FOR IMMEDIATE RELEASE – June 16, 2005

Contact: Michael Murphy, ADHS Public Information: (602) 542-1094
David Runyan, NWS Public Information: (602) 275-7002 ext. 223

With daytime temperatures stuck in the triple digits, Arizona summers turn dangerous and deadly.

Last summer, 34 Arizona residents died as a direct result of excessive exposure to heat, including three infants that were left in parked cars.

"It breaks my heart that we lost three infants to heat exposure inside parked cars last year. It's a completely preventable tragedy," said Susan Gerard, Director of the Arizona Department of Health Services.

Temperatures inside parked vehicles climb very rapidly. Temperatures rise approximately 20 degrees (F) in the first 10 minutes, potentially reaching more than 130 degrees in only 10 minutes. After 20 minutes, the average vehicle temperature climbs more than 30 degrees, to more than 140 degrees. Temperatures in this range can cause serious illness or even death in only a few minutes.

With the hottest summer months still on the horizon, the Arizona Department of Health and the National Weather Service are urging all residents to take precautions against dehydration and heat related illness.

"Summertime heat is the most dangerous weather phenomenon we face in Arizona," said David Runyan, of the National Weather Service in Phoenix. The National Weather Service again will be issuing Heat Watches and Warnings to let people know which days pose the greatest risk for heat related illness.

Almost every summer day poses a threat for heat-related illness if people don't take precautions.

People suffer heat-related illness when the body's temperature control system is overloaded and the body can no longer cool itself. As long as blood is flowing properly to the skin, extra heat from the body is pumped to the skin and removed by sweat evaporation. If fluids are not replaced soon enough, heat stroke can result, potentially leading to brain damage or death.

Symptoms of heat illness include heavy sweating, muscle cramps, weakness, dizziness, nausea, weak but rapid pulse and headaches. People with these symptoms should find shade, drink water slowly and make sure there is good ventilation.

Staying in an air-conditioned area, either at home or in a public place such as a mall, library

or recreation center is the most effective way to fight heat. If air conditioning is not available, pull the shades over the windows and use cross-ventilation and fans to cool rooms. A cool shower or bath also is an effective way to cool off. Limit use of stoves and ovens to keep home temperatures lower.

Other tips to avoid heat-related illness:

- Never leave infants, children or pets inside a parked vehicle.
- Increase fluid intake, regardless of activity level. Don't wait until thirsty to drink fluids; drink more liquid than one's thirst indicates.
- Avoid "heat hangover." Continue to drink fluids even after strenuous activity. This will enable the body to maintain optimum hydration, and help prevent the after effects of heat exposure such as headaches and fatigue.
- Avoid beverages containing alcohol, caffeine or large amounts of sugar as they dehydrate the body.
- Avoid very cold beverages as they cause stomach cramps.
- Limit exercise or outdoor activity between the hours of 11 a.m. and 3 p.m. when the sun is at its peak intensity. If active during this time frame, drink a minimum of 16 to 32 ounces of water each hour.
- Some medications, both prescription and over-the-counter, may increase the risk of heat related illness. Consult your physician if you have questions.

When outdoors:

- Wear a sunscreen with a minimum SPF 15. Apply at least 30 minutes prior to going outdoors, and re-apply as necessary.
- Rest frequently in shady areas so that the body's temperature has a chance to recover.
- If unaccustomed to working or exercising in a hot environment, gradually increase the pace and limit exercise or work time.
- Wear lightweight, loose-fitting clothing; sunglasses to protect the eyes; and a wide-brimmed hat to provide shade and keep the head cool.
- Take special precaution with infants and young children by dressing them in loose, cool clothing and shading their heads and faces with hats or an umbrella. Protect their feet with shoes.

http://azdhs.gov/news/2005-all/deadlysummer.htm

Título: **Manténgase Sano Durante el Calor Mortal del Verano en Arizona**

Fecha: Para publicación inmediata – June 16, 2005

Contacto: Michael Murphy, ADHS Public Information: (602) 542-1094
David Runyan, NWS Public Information: (602) 275-7002 ext. 223

Con las temperaturas diarias llegando a alturas hasta de tres dígitos, los veranos de Arizona pueden ser peligrosos y mortales.

Durante el verano pasado, 34 residentes, incluyendo a 3 infantes que fueron abandonados en vehículos estacionados, murieron por exponerse excesivamente al calor.

“Me rompe el corazón el que hayamos perdido a tres infantes el año pasado debido al calor dentro de autos estacionados. Es una tragedia completamente prevenible, ” dijo Susan Gerard, Directora del Departamento de Salud de Arizona.

Las temperaturas dentro de vehículos estacionados suben rápidamente. Dichas temperaturas aumentan aproximadamente 20 grados (F) durante los primeros 10 minutos, con un potencial de alcanzar hasta más de 130 grados en sólo 10 minutos. Después de 20 minutos, la temperatura promedio en un vehículo aumenta más de 30 grados, subiendo hasta a más de 140 grados. Las temperaturas en este nivel pueden causar enfermedades severas y hasta la muerte en tan solo unos minutos.

Los meses más calientes del verano aún están por pasar y el Departamento de Salud de Arizona, con el Servicio Nacional del Tiempo, sugieren que todos los residentes tomen precauciones contra la deshidratación y enfermedades causadas por el calor.

"El calor veranal es el fenómeno natural más peligroso que enfrentamos en Arizona,” dijo David Runyan, del Servicio Nacional del Tiempo en Phoenix. El Servicio Nacional del Tiempo nuevamente mantendrá vigilancia del calor y producirá mensajes alertas para que la gente esté al tanto de los días en que el riesgo de enfermarse debido al calor, es más alto.

La mayoría de los días de verano son peligrosos si la gente no toma precauciones para evitar el calor.

Una persona se enferma por el calor cuando el sistema de control de temperatura del cuerpo no puede refrescarse a sí mismo. Cuando la sangre circula adecuadamente llegando a la piel, el calor sobrante del cuerpo se expulsa por la piel y se elimina con la evaporación del sudor. Sin embargo, si los líquidos del cuerpo no son reemplazados debidamente, el cuerpo no puede sudar y controlar su temperatura causando desmayo, desorientamiento, posiblemente sofocación -- estado médico conocido como "heatstroke" en Estados Unidos que puede resultar en daños al cerebro o la muerte.

Los síntomas de enfermedad causada por el calor también incluyen sudor abundante, calambres, debilidad, mareos, nausea, pulso débil pero rápido, y dolores de cabeza. Cualquier persona con estos síntomas debe refugiarse en la sombra inmediatamente, beber agua despacio, y permanecer en buena ventilación.

El modo más efectivo de combatir el calor es manteniéndose en un ambiente con aire acondicionado, ya sea en la casa, o en algún sitio público como el "mall", la biblioteca, o algún centro de recreación. Si no tiene aire acondicionado, ponga algún tipo de sombra en

sus ventanas y use ventilación natural con abanicos para refrescar los cuartos. Dése un baño con agua fresca seguido y mantenga el uso de estufas y hornos a lo más mínimo.

Otras sugerencias para evitar las enfermedades causadas por el calor:

- Nunca deje infantes, niños, o mascotas dentro de un vehículo estacionado.
- Aumente su consumo de líquidos sin importar su nivel de actividad. No se espere a estar sediento para beber líquidos; beba más de lo que normalmente bebe para calmar la sed.
- Evite "heat hangover." Siga tomando líquidos aún después de actividades intensas. Esto le ayudará a su cuerpo a mantener una hidratación óptima y a prevenir los efectos de exposición al calor como dolor de cabeza y fatiga.
- Evite bebidas con alcohol, cafeína, y altas cantidades de azúcar, ya que éstas deshidratan al cuerpo.
- Evite bebidas demasiado heladas ya que le pueden causar calambres o cólicos en el estómago.
- Disminuya o evite el ejercicio o actividad al aire libre durante las horas 11 a.m. y 3 p.m. que es cuando los rayos del sol son más intensos. Si no puede evitar la actividad afuera durante esas horas, beba por lo menos entre 16 y 32 onzas de agua cada hora.
- Algunas medicinas, con o sin receta, pueden aumentar su riesgo de enfermarse por el calor. Si tiene dudas o preguntas consulte con su médico.

Cuando se encuentre al aire libre:

- Use productos con protección solar con un factor mínimo de 15 o "SPF 15". Aplíquese el producto aproximadamente 30 minutos antes de salir y repita la aplicación como considere necesario.
- Descanse frecuentemente en lugares con sombra para que su cuerpo tenga oportunidad de recobrar su temperatura.
- Si no esta acostumbrado a trabajar o hacer ejercicio en un ambiente caliente, empiece despacio aumentando su paso gradualmente y limite el tiempo de la actividad.
- Use ropa ligera y suelta; gafas oscuras para proteger sus ojos; y un sombrero amplio que le cubra la cabeza y el cuello.
- Asegúrese que sus bebés y niños usen ropa suelta, fresca, y ligera; que cubran su cabeza y cara con sombreros o sombrillas; y que cubran sus pies con zapatos.

http://www.azdhs.gov/news/2005-all/deadlysummer_sp.htm

Release: **Health Department Urges Caution as Deadly Heat Grips Arizona**

Release Date: FOR IMMEDIATE RELEASE – July 18, 2005

Contact: Mary Ehlert, ADHS Public Information: (602) 364-1201; cell (602) 721-0532

Arizona's heat is not just uncomfortable, it is deadly. Last week a child died in a hot car and over the weekend three people died from heat-related causes. With daytime temperatures stuck in the teen triple digits, Arizona's summer has again turned dangerous and deadly.

Last summer, 34 Arizona residents died as a direct result of excessive exposure to heat, including three infants that were left in parked cars.

"These are some of the hottest days of summer and people need to be diligent about staying indoors, wearing light clothing and drinking water," said Will Humble of the Arizona Department of Health Services. "People who work outdoors are at especially high risk. People that have outdoor occupations need to take more breaks and get more of their work done in the early morning hours if possible.

Young children and the elderly are also at greater risk to suffer from heat-related illness. "All licensed facilities including childcare centers, healthcare centers, and hospices, need to pay attention to modifying activity levels and take care to make sure hydration is increased," said Humble. "This is also a good time to check on your neighbors, especially if they are elderly, living alone, or may have been affected by the weekend's power outages. Take the time to stop by and ensure your neighbors are taking extra precautions as well."

People suffer heat-related illness when the body's temperature control system is overloaded and the body can no longer cool itself. As long as blood is flowing properly to the skin, extra heat from the body is pumped to the skin and removed by sweat evaporation. If fluids are not replaced soon enough, heat stroke can result, potentially leading to brain damage or death.

Symptoms of heat illness include heavy sweating, muscle cramps, weakness, dizziness, nausea, weak but rapid pulse and headaches. People with these symptoms should find shade, drink water slowly and make sure there is good ventilation.

Staying in an air-conditioned area, either at home or in a public place such as a mall, library or recreation center is the most effective way to fight heat. If air conditioning is not available, pull the shades over the windows and use cross-ventilation and fans to cool rooms. A cool shower or bath also is an effective way to cool off. Limit use of stoves and ovens to keep home temperatures lower.

Other tips to avoid heat-related illness:

- Never leave infants, children or pets inside a parked vehicle.
- Increase fluid intake, regardless of activity level. Don't wait until thirsty to drink fluids; drink more liquid than one's thirst indicates.
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- Avoid beverages containing alcohol, caffeine or large amounts of sugar as they dehydrate the body.
- Avoid very cold beverages as they cause stomach cramps.
- Limit exercise or outdoor activity between the hours of 11 a.m. and 3 p.m. when the sun is at its peak intensity. If active during this time frame, drink a minimum of 16 to 32 ounces of water each hour.
- Some medications, both prescription and over-the-counter, may increase the risk of heat related illness. Consult your physician if you have questions.

When outdoors:

- Wear a sunscreen with a minimum SPF 15. Apply at least 30 minutes prior to going outdoors, and re-apply as necessary.
- Rest frequently in shady areas so that the body's temperature has a chance to recover.
- If unaccustomed to working or exercising in a hot environment, gradually increase the pace and limit exercise or work time.
- Wear lightweight, loose-fitting clothing; sunglasses to protect the eyes; and a wide-brimmed hat to provide shade and keep the head cool.
- Take special precaution with infants and young children by dressing them in loose, cool clothing and shading their heads and faces with hats or an umbrella. Protect their feet with shoes.

http://azdhs.gov/news/2005-all/deadheat.htm

Release: **Return Of Extreme Summer Heat Brings Deadly Dangers**

Release Date: FOR IMMEDIATE RELEASE – August 29, 2005

Contact: Michael Murphy, ADHS Public Information: (602) 542-1094
David Engelthaler, State Epidemiologist: (602) 364-3297

The Arizona Department of Health Services reminds residents to take extra care during the state's latest bout of extreme heat.

"Temperatures over 110 degrees means taking special precautions to protect ourselves and our loved ones from the risk of heat-related illness and death," said Susan Gerard, Director of the Arizona Department of Health Services. "The best way to combat this is to stay hydrated and to stay out of the sun."

People who work outdoors are at especially high risk. People that have outdoor occupations need to take more breaks and get more of their work done in the early morning hours if possible. Young children and the elderly are also at greater risk to suffer from heat-related illness.
"This is a good time to check your neighbors, especially if they are elderly," Gerard said. People suffer heat-related illness when the body's temperature control system is overloaded and the body can no longer cool itself. As long as blood is flowing properly to the skin, extra heat from the body is pumped to the skin and removed by sweat evaporation. If fluids are not replaced soon enough, heat stroke can result, potentially leading to brain damage or death.

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http://azdhs.gov/news/2005-all/extremeheat.htm

APPENDIX D

CDC - Frequently Asked Questions (FAQ) About Extreme Heat

1. **What happens to the body as a result of exposure to extreme heat?**
   People suffer heat-related illness when the body's temperature control system is overloaded. The body normally cools itself by sweating. But under some conditions, sweating just isn't enough. In such cases, a person's body temperature rises rapidly. Very high body temperatures may damage the brain or other vital organs. Several factors affect the body's ability to cool itself during extremely hot weather. When the humidity is high, sweat will not evaporate as quickly, preventing the body from releasing heat quickly. Other conditions that can limit the ability to regulate temperature include old age, youth (age 0-4), obesity, fever, dehydration, heart disease, mental illness, poor circulation, sunburn, and prescription drug use and alcohol use.

2. **Who is at greatest risk for heat-related illness?**

   Those at greatest risk for heat-related illness include infants and children up to four years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications.

3. **What is heat stroke?**

   Heat stroke is the most serious heat-related illness. It occurs when the body becomes unable to control its temperature: the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Body temperature may rise to 106°F or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not provided.

4. **What are the warning signs of a heat stroke?**

   Warning signs of heat stroke vary but may include the following:

- An extremely high body temperature (above 103°F)
- Red, hot, and dry skin (no sweating)
- Rapid, strong pulse
- Throbbing headache
- Dizziness
- Nausea
- Confusion
- Unconsciousness

5. **What should I do if I see someone with any of the warning signs of heat stroke?**

   If you see any of these signs, you may be dealing with a life-threatening emergency.

Have someone call for immediate medical assistance while you begin cooling the victim. Do the following:

- Get the victim to a shady area.
- Cool the victim rapidly, using whatever methods you can. For example, immerse the victim in a tub of cool water; place the person in a cool shower; spray the victim with cool water from a garden hose; sponge the person with cool water; or if the humidity is low, wrap the victim in a cool, wet sheet and fan him or her vigorously.
- Monitor body temperature and continue cooling efforts until the body temperature drops to 101-102°F.
- If emergency medical personnel are delayed, call the hospital emergency room for further instructions.
- Do not give the victim alcohol to drink.
- Get medical assistance as soon as possible.

6. **What is heat exhaustion?**

   Heat exhaustion is a milder form of heat-related illness that can develop after several days of exposure to high temperatures and inadequate or unbalanced replacement of fluids. Those most prone to heat exhaustion are elderly people, those with high blood pressure, and those working or exercising in a hot environment.

7. **What are the warning signs of heat exhaustion?**

   The warning signs of heat exhaustion include the following:

- Heavy sweating
- Paleness
- Muscle cramps
- Tiredness
- Weakness
- Dizziness
- Headache
- Nausea or vomiting
- Fainting

The skin may be cool and moist. The pulse rate will be fast and weak, and breathing will be fast and shallow. If heat exhaustion is untreated, it may progress to heat stroke. See medical attention if symptoms worsen or last longer than one hour.

8. **What steps can be taken to cool the body during heat exhaustion?**

- Drink cool, nonalcoholic beverages.
- Rest.
- Take a cool shower, bath, or sponge bath.
- Seek an air-conditioned environment.
- Wear lightweight clothing.

9. **What are heat cramps and who is affected?**

   Heat cramps are muscle pains or spasms – usually in the abdomen, arms, or legs – that may occur in association with strenuous activity. People who sweat a lot during strenuous activity are prone to heat cramps. This sweating depletes the body's salt and moisture. The low salt level in the muscles causes painful cramps. Heat cramps may also be a symptom of heat exhaustion. If you have heart problems or are on a low-sodium diet, seek medical attention for heat cramps.

10. **What should I do if I have heat cramps?**

    If medical attention is not necessary, take the following steps:

- Stop all activity and sit quietly in a cool place.
- Drink clear juice or a sports beverage.
- Do not return to strenuous activity for a few hours after the cramps subside because further exertion may lead to heat exhaustion or heat stroke.
- Seek medical attention for heat cramps if they do not subside in 1 hour.

11. **What is heat rash?**

    Heat rash is a skin irritation caused by excessive sweating during hot, humid weather. It can occur at any age but is most common in young children. Heat rash looks like a red cluster of pimples or small blisters. It is more likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases.

12. **What is the best treatment for heat rash?**

    The best treatment for heat rash is to provide a cooler, less humid environment. Keep the affected area dry. Dusting powder may be used to increase comfort, but avoid using ointments or creams -- they keep the skin warm and moist and may make the condition worse.

13. **Can medications increase the risk of heat-related illness?**

    The risk for heat-related illness and death may increase among people using the following drugs: (1) psychotropics, which affect psychic function, behavior, or experience (e.g. haloperidol or chlorpromazine); (2) medications for Parkinson's disease, because they can inhibit perspiration; and (3) tranquilizers such as phenothiazines, butyrophenones, and thiozanthenes.

14. **How effective are electric fans in preventing heat-related illness?**

    Electric fans may provide comfort, but when the temperature is in the high 90s, fans will not prevent heat-related illness. Taking a cool shower or bath or moving to an air-conditioned place is a much better way to cool off. Air conditioning is the strongest

protective factor against heat-related illness. Exposure to air conditioning for even a few hours a day will reduce the risk for heat-related illness. Consider visiting a shopping mall or public library for a few hours.

15. **How can people protect their health when temperatures are extremely high?**

    Remember to keep cool and use common sense. Drink plenty of fluid, replace salts and minerals, wear appropriate clothing and sunscreen, pace yourself, stay cool indoors, schedule outdoor activities carefully, use a buddy system, monitor those at risk, and adjust to the environment.

16. **How much should I drink during hot weather?**

    During hot weather you will need to drink more liquid than your thirst indicates. Increase your fluid intake, regardless of your activity level. During heavy exercise in a hot environment, drink two to four glasses (16-32 ounces) of cool fluids each hour. Avoid drinks containing alcohol because they will actually cause you to lose more fluid.

17. **Should I take salt tablets during hot weather?**

    Do not take salt tablets unless directed by your doctor. Heavy sweating removes salt and minerals from the body. These are necessary for your body and must be replaced. The easiest and safest way to do this is through your diet. Drink fruit juice or a sports beverage when you exercise or work in the heat.

18. **What is the best clothing for hot weather or a heat wave?**

    Wear as little clothing as possible when you are at home. Choose lightweight, light-colored, loose-fitting clothing. In the hot sun, a wide-brimmed hat will provide shade and keep the head cool. If you must go outdoors, be sure to apply sunscreen 30 minutes prior to going out and continue to reapply according to the package directions. Sunburn affects your body's ability to cool itself and causes a loss of body fluids. It also causes pain and damages the skin.

19. **What should I do if I work in a hot environment?**

    Pace yourself. If you are not accustomed to working or exercising in a hot environment, start slowly and pick up the pace gradually. If exertion in the heat makes your heart pound and leaves you gasping for breath, STOP all activity. Get into a cool area or at least in the shade, and rest, especially if you become lightheaded, confused, weak, or faint.

This information is provided by the Centers for Disease Control and Prevention National Center for Environmental Health NCEH's Health Studies Branch.

http://www.bt.cdc.gov/disasters/extremeheat/faq.asp

APPENDIX E

MARICOPA COUNTY, ARIZONA

EMERGENCY OPERATIONS PLAN

ANNEX K – EXCESSIVE HEAT EMERGENCIES

I. SITUATION

A. Periods of prolonged excessive heat can result in life-threatening situations for a large segment of the population, particularly among elderly persons who do not have access to air-conditioning. Documented cases of fatality counts of over 100 have occurred in other U.S. cities during the past few years as a result of prolonged heat waves. In the summer of 2005, a prolonged heat wave resulted in the deaths of several people in the Phoenix metropolitan area.

B. By recognizing a heat wave in its developmental stages, the county can take actions that will enable its citizens to avoid life-threatening conditions.

C. Violent summer thunderstorms can be particularly serious. In addition to increasing the humidity, they can produce power outages that deprive large segments of the population of access to air-conditioning in their homes.

II. MISSION

To establish a program that will both educate the population about how to cope with a heat wave and, when necessary, provide protection from its effects to vulnerable segments of the population.

III. EXECUTION

A. Concept of Operations

1. The Public Information Office will issue news releases to inform the public of how to deal with the heat wave. The initial news releases will occur prior to the anticipated start of high temperatures, and additional news releases will occur when a life-threatening heat emergency is imminent.

2. The Phoenix office of the National Weather Service (NWS) issues three types of heat-related messages. These messages are based on four factors – temperature, humidity, amount of cloudiness, and the expected duration of these conditions. The combination of factors that will trigger one of these heat-related messages varies according to the time of year. For example, a combination of factors that would result in an excessive

heat warning in early May might not result in one in mid-July. These three NWS products are:

a. Heat Advisory – issued when the temperature is forecast to be unusually hot but not life-threatening.

b. Excessive Heat Watch – issued when conditions are likely to result in a life-threatening heat emergency within the next 24 to 48 hours.

c. Excessive Heat Warning – issued when a life-threatening heat emergency exists or is imminent.

3. The Public Information Office will issue the appropriate heat emergency messages prior to the beginning of the summer heat season. Other components of this annex will be implemented when the National Weather Service issues an **excessive heat watch** or an **excessive heat warning** for the Phoenix metropolitan area. Services and activities provided under this annex may be continued for **48 hours** after the expiration of the excessive heat warning.

4. The City of Phoenix has developed a comprehensive plan for dealing with heat emergencies, including the special needs associated with the homeless population, which is primarily located in the downtown area. This annex is primarily oriented toward addressing excessive heat-related issues in outlying communities, as well as augmenting City of Phoenix efforts when their resources are overwhelmed.

5. The Department of Emergency Management, or the EOC if activated, will ensure implementation of the activities discussed in this annex.

B. Organization. Under most circumstances, the EOC will not be activated to implement the provisions of this annex.

C. Tasks.

1. The Chairman of the Board of Supervisors will declare a local emergency if deemed to be necessary.

2. Department of Emergency Management

a. Ensure that the provisions of this annex are implemented.

b. When the NWS issues an **excessive heat watch or warning**:

(1) Notify all county departments and offices tasked below that an excessive heat watch or warning has been issued and that the provisions of this annex are to be implemented.

(2) Notify the emergency managers of all affected cities and towns in the county that an excessive heat watch or warning has been issued. Collect information regarding actions taken by the cities and towns, and ensure that affected county departments and offices are made aware of those actions.

(3) When required, assist in the coordination of Citizen Corps volunteers for staffing shelters and hydration stations, staffing volunteer phone banks, distribution of informational flyers to the affected population, and other related activities.

c. When NWS issues an **excessive heat warning**:

(1) Activate the EOC if necessary.

(2) Coordinate with other departments and agencies tasked in this annex to ensure completion of assigned responsibilities.

(3) Compile, maintain, and distribute listings of cooling centers, hydration stations, and shelters established in response to the excessive heat emergency.

(4) When requested during an excessive heat warning that lasts for an extended period of time, assist affected cities and towns in setting up and operating volunteer reception centers to process and employ spontaneous unaffiliated volunteers.

3. Public Information Office

a. By May 15 of each year, initiate an education campaign for the public, alerting them of the potential dangers of the upcoming summer heat season and actions they should take to prepare for it. The education campaign will be coordinated with the education campaigns of the National Weather Service and cities and towns throughout the county and will emphasize reaching out to the Spanish-speaking component of the community.

b. Upon issuance of an **excessive heat watch or warning**, issue press releases giving the public guidance about how to deal with the heat wave emergency. These press releases will be coordinated with similar press releases by cities and towns throughout the county and will emphasize outreach to the Spanish-speaking component of the community. The press releases should emphasize what portion of the population is at-risk the most, how to recognize and prevent heat stroke, the importance of getting at least two to four hours a day of cooling, where cooling is available, the need to look out for your neighbors, heat-related risks to pets, risks associated with certain medications during extreme heat

conditions, and where to call for assistance.

4. Department of Public Health

   a. Provide assistance to the Public Information Office in the development of press releases as they relate to health.

   b. Set up and operate a hotline and a website to update the public regarding heat conditions and inform them of actions that can be taken to deal with the heat.

   c. When the NWS issues an **excessive heat warning**:

      (1) Increase surveillance efforts pertaining to heat-related deaths and injuries, in cooperation with the Medical Examiner's office and area hospitals.

      (2) Advise area hospitals of the excessive heat warning and urge them to consider the extreme weather condition when discharging patients.

      (3) Expand street outreach by Health Care for the Homeless staff.

5. Human Services Department

   a. When NWS issues an **excessive heat watch or warning**, post and distribute excessive heat warnings and guidance materials at Human Services Department offices and affiliated offices, including Special Transportation Services (STS) vans, and at Head Start classrooms, Community Action Program (CAP) offices, Workforce Development One-Stop Centers, etc.

   b. When NWS issues an **excessive heat warning**:

      (1) Utilize available staff (e.g. STS drivers and schedulers, CAP workers, Senior Adult Independent Living [SAIL] case managers) to assist with communication and welfare checks for at-risk populations, including the elderly, disabled, and home-bound individuals, through home visits and phone calls.

      (2) Utilize available STS vans to move persons having special needs to cooling centers or other locations that will reduce their vulnerability.

      (3) Assist with distribution of donated water through established service centers and program activities (e.g. Community Actions Programs, Head Start, Workforce development One-

Stop Centers, STS home-delivered meals and transportation services, SAIL case management services).

6. Department of Transportation / Flood Control District

   a. Include heat-related information in daily weather outlooks prepared by the Flood Control District's Meteorological Services Program. This information is used by several county agencies to determine whether outdoor activities should be curtailed prior to the normal time.

   b. When the NWS issues an **excessive heat warning**, accomplish the following when requested:

      (1) Provide canopies as a means for people affected by the heat emergency and workers at the site to get shade.

      (2) Store donated water and assist in its distribution.

7. Facilities Management Department – when the NWS issues an **excessive heat warning,** accomplish the following when requested:

   a. Provide temporary shelter in parking garages or surface lots.

   b. Provide security if shelter is on county property.

   c. Provide fans for air circulation if shelter is on county property.

   d. Facilitate setup of tents, tables, chairs, etc. if shelter is on county property.

8. MCSO

   a. When the NWS issues an **excessive heat watch or warning**, distribute informational flyers to affected populations within MCSO's jurisdiction (e.g. Sun City, Sun Lakes).

   b. When the NWS issues an **excessive heat warning**, accomplish the following when requested:

      (1) Provide security at cooling centers, hydration stations, or other locations established by the county as a result of the emergency.

      (2) Provide tents for cooling centers and/or hydration stations. Provide labor by jail inmates to set the tents up.

      (3) Provide 2 1/2 -ton trucks and drivers from the posse to move supplies to shelters, cooling centers, hydration stations, etc.

(4) Provide ice for shelters, cooling centers, hydration stations, etc.

9. Animal Care and Control Department

a. Prior to an excessive heat incident

(1) Establish memorandums of understanding (MOU) with Arizona Veterinary Medical Association and/or local veterinarians to provide emergency veterinary care for animals.

(2) Create and maintain a stockpile of animal food and water.

(3) Provide Community Emergency Response Team (CERT) training for Maricopa County Animal Care and Control staff.

(4) Provide hot weather care tips to the public.

b. When NWS declares an **Excessive Heat Watch**:

(1) Notify staff, reserves, and volunteers to be on standby.

(2) Notify support organizations

(3) Coordinate with the Arizona Department of Agriculture for livestock.

c. If heat-related evacuations occur

(1) Coordinate with agencies providing shelter services to care for the pets of evacuees

(a) Shelter pets in place when possible.

(b) Activate the MOU with the Arizona Veterinary Medical Association for animals with medical needs.

(c) Provide temporary shelter for animals that cannot be sheltered in place.

(2) Coordinate with the American Red Cross if a reception and care center is established and establish a temporary veterinary evacuation center.

10. Other Departments

a. Post heat tips for staff.

b. If the NWS issues an **excessive heat watch or warning**,

encourage field staff to monitor conditions of citizens most likely to suffer during a prolonged heat wave (e.g. elderly, homebound, homeless, etc.). Field staff should call 911 if an emergency is encountered; otherwise, notify the county emergency operations center (EOC).

D. Support.

1. National Weather Service. When an **excessive heat watch or warning** is issued, alert the Maricopa County Department of Emergency Management duty officer and the Maricopa County Public Health Department on-call physician.

2. The Red Cross (Grand Canyon Chapter) can establish and operate shelters if required. This effort will generally focus on facilities capable of housing a large number of people in order to minimize the number of shelters that need to be opened. The Red Cross can either provide or arrange for the provision of food, water, and basic nursing needs at shelters. Assistance from outside agencies will be needed if large quantities of water are needed, and assistance in staffing the shelters will also be needed, particularly for long-term events. The Red Cross can also obtain up to 10,000 cots to support large-scale shelter operations, but 48 to 72 hours of lead time is required, as the cots are stored out of state. Approximately 2,000 cots are stored in Arizona, of which about 400 are in the Phoenix metropolitan area.

3. The Salvation Army (TSA) can:

   a. Maintain, deploy, and operate several hydration stations, which will include shade tents, water, ice, cool clean clothing, chairs, and tables. These stations will be established on a daily basis, during limited daylight hours, at locations identified through the Maricopa County EOC and coordinated with local municipalities or private organizations. TSA will provide volunteers and supplies to support these stations.

   b. If necessary and when requested through the Maricopa County EOC, coordinate donations management activities in support of this annex. Such activities may include the effort to solicit specific in-kind gifts, such as water, from the public. Additional activities include the collection and temporary storage of donations. TSA will coordinate the transportation and distribution of the collected goods with the various agencies included in this annex.

4. Cities and towns have facilities that can be of assistance during a heat wave emergency, such as senior centers, human resources centers, and libraries, which can afford seniors and others a place to escape the heat

and can also serve as distribution points for donated water.

5. The Human Services Campus, LLC, is a 501 (c)(3) organization located on county-owned property in downtown Phoenix that serves the needs of the homeless population in the downtown area. Its clients are triaged at the Day Resource Center for services provided by other providers on the campus. Those other providers include Healthcare for the Homeless (a clinic managed by the Maricopa County Public Health Department), the Saint Vincent de Paul Society, Central Arizona Shelter Services (CASS), and NOVA Safe Haven. Although the campus is on county-owned property, the only county-owned building is the Healthcare for the Homeless clinic.

6. Maricopa County is a major funding partner for two facilities that provide short-term overnight shelter for the chronic homeless population in the downtown Phoenix area when the "overflow" shelter at 11th Avenue and West Watkins Street is shut down, generally between late March and mid-to-late November. These two facilities are the low-demand men's shelter at 1214 West Madison Avenue, which has a capacity of approximately 300, and the low-demand women's/children's shelter at 1001 West Jefferson Street, with a capacity of about 70. Both facilities are managed by CASS. They are air-conditioned and have both sleeping capacity and restrooms. They are normally open from 7:00 p.m. to 7:00 a.m. but, during an excessive heat emergency, could provide daytime shelter.

7. Volunteer agencies such as the Saint Vincent de Paul Society can offer sheltering, feeding, and transportation assistance to the homeless and other special needs populations.

8. Local Citizen Corps councils can provide volunteers to assist in operating shelters, operating phone banks, distributing informational brochures and fliers, and other related activities. The county EOC will coordinate Citizen Corps assistance as required.

9. Arizona Public Service (APS) and Salt River Project (SRP) generally offer free bagged ice and dry ice to affected customers when power interruptions lead to extended outages in their service areas. In addition, both utilities suspend service disconnections for non-payment of accounts during periods of severe heat.

IV. DIRECTION AND CONTROL. Not applicable

V. ADMINISTRATION AND LOGISTICS. Not applicable.

APPENDIX F

HEAT RELATED ILLNESSES AND SAFETY

(Information compiled by ADHS Industrial Hygienist and Safety Officer Don Kautz)

HOW THE BODY HANDLES HEAT

The human body, being warm blooded, maintains a fairly constant internal temperature, even though it is being exposed to varying environmental temperatures. To keep internal body temperatures within safe limits, the body must get rid of its excess heat, primarily through varying the rate and amount of blood circulation through the skin and the release of fluid onto the skin by the sweat glands. These automatic responses usually occur when the temperature of the blood exceeds 98.6^{o}F and are kept in balance and controlled by the brain. In this process of lowering internal body temperature, the heart begins to pump more blood, blood vessels expand to accommodate the increased flow, and the microscopic blood vessels (capillaries) which thread through the upper layers of the skin begin to fill with blood. The blood circulates closer to the surface of the skin, and the excess heat is lost to the cooler environment.

If heat loss from increased blood circulation through the skin is not adequate, the brain continues to sense overheating and signals the sweat glands in the skin to shed large quantities of sweat onto the skin surface. Evaporation of sweat cools the skin, eliminating large quantities of heat from the body.

As environmental temperatures approach normal skin temperature, cooling of the body becomes more difficult. If air temperature is as warm as or warmer than the skin, blood brought to the body surface cannot lose its heat. Under these conditions, the heart continues to pump blood to the body surface, the sweat glands pour liquids containing electrolytes onto the surface of the skin and the evaporation of the sweat becomes the principal effective means of maintaining a constant body temperature. Sweating does not cool the body unless the moisture is removed from the skin by evaporation. Under conditions of high humidity, the evaporation of sweat from the skin is decreased and the body's efforts to maintain an acceptable body temperature may be significantly impaired. These conditions adversely affect an individual's ability to work in the hot environment. With so much blood going to the external surface of the body, relatively less goes to the active muscles, the brain, and other internal organs; strength declines; and fatigue occurs sooner than it would otherwise. Alertness and mental capacity also may be affected. Workers who must perform delicate or detailed work may find their accuracy suffering, and others may find their comprehension and retention of information lowered.

SAFETY PROBLEMS

Certain safety problems are common to hot environments. Heat tends to promote accidents due to the slipperiness of sweaty palms, dizziness, or the fogging of safety glasses. Wherever there exists molten metal hot surfaces, steam, etc., the possibility of burns from accidental contact also exists.

Aside from these obvious dangers, the frequency of accidents in general appears to be higher in hot environments than in more moderate environmental conditions. One reason is that working in a hot environment lowers the mental alertness and physical performance of an individual. Increased body temperature and physical discomfort promote irritability, anger, and other emotional states which sometimes cause workers to overlook safety procedures or to divert attention from hazardous tasks.

HEALTH PROBLEMS

Excessive exposure to a hot work environment can bring about a variety of heat-induced disorders.

CAUTION: Persons with heart problems or those on a low sodium diet who work in hot environments should consult a physician about what to do under these conditions.

Heat Stroke

Heat stroke is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105^{o}F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur.

Any person with signs or symptoms of heat stroke requires immediate hospitalization. However, first aid should be immediately administered. This includes removing the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Further treatment at a medical facility should be directed to the continuation of the cooling process and the monitoring of complications which often accompany the heat stroke. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

Heat Exhaustion

Heat exhaustion includes several clinical disorders having symptoms which may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated.

In most cases, treatment involves having the victim rest in a cool place and drink plenty of liquids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.

Heat Cramps

Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. The drinking of large quantities of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly thereafter, the low salt level in the muscles causes painful cramps.

The affected muscles may be part of the arms, legs, or abdomen, but tired muscles (those used in performing the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours and may be relived by taking salted liquids by mouth.

Fainting

A worker who is not accustomed to hot environments and who stands erect and immobile in the heat may faint. With enlarged blood vessels in the skin and in the lower part of the body due to the body's attempts to control internal temperature, blood may pool there rather than return to the heart to be pumped to the brain.

Upon lying down, the worker should soon recover. By moving around, and thereby preventing blood from pooling, the patient can prevent further fainting.

Heat Rash

Heat rash, also known as prickly heat, is likely to occur in hot, humid environments where sweat is not easily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by infection, prickly heat can be very uncomfortable and may reduce a worker's performance.

The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin.

Transient Heat Fatigue

Transient heat fatigue refers to the temporary state of discomfort and mental or psychologic strain arising from prolonged heat exposure. Workers unaccustomed to the heat are particularly susceptible and can

suffer, to varying degrees, a decline in task performance, coordination, alertness, and vigilance.

The severity of transient heat fatigue will be lessened by a period of gradual adjustment to the hot environment (heat acclimatization).

PREPARING FOR THE HEAT

One of the best ways to reduce heat stress on workers is to minimize heat in the workplace. However, there are some work environments where heat production is difficult to control, such as when furnaces or sources of steam or water are present in the work area or when the workplace itself is outdoors and exposed to varying warm weather conditions.

Humans are, to a large extent, capable of adjusting to the heat. This adjustment to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more endurable.

On the first day of work in a hot environment, the body temperature, pulse rate, and general discomfort will be higher. With each succeeding daily exposure, all of these responses will gradually decrease, while the sweat rate will increase. When the body becomes acclimated to the heat, the worker will find it possible to perform work with less strain and distress.

Gradual exposure to heat gives the body time to become accustomed to higher environmental temperatures. Heat disorders in general are more likely to occur among workers who have not been given time to adjust to working in the heat or among workers who have been away from hot environments and who have gotten accustomed to lower temperatures. Hot weather conditions of the summer are likely to affect the worker who is not acclimatized to heat. Likewise, workers who return to work after a leisurely vacation or extended illness may be affected by the heat in the work environment. Whenever such circumstances occur, the worker should be gradually reacclimatized to the hot environment.

LESSENING STRESSFUL CONDITIONS

Many industries have attempted to reduce the hazards of heat stress by introducing engineering controls, training workers in the recognition and prevention of heat stress, and implementing work-rest cycles. Heat stress depends, in part, on the amount of heat the worker's body produces while a job is being performed. The amount of heat produced during hard, steady work is much higher than that produced during intermittent or light work. Therefore, one way of reducing the potential for heat stress is to make the job easier or lessen its duration by providing adequate rest time.

Mechanization of work procedures can often make it possible to isolate workers from the heat sources (perhaps in an air-conditioned booth) and increase overall productivity by

decreasing the time needed for rest. Another approach to reducing the level of heat stress is the use of engineering controls which include ventilation and heat shielding.

Number and Duration of Exposures

Rather than be exposed to heat for extended periods of time during the course of a job, workers should, wherever possible, be permitted to distribute the workload evenly over the day and incorporate work-rest cycles. Work-rest cycles give the body an opportunity to get rid of excess heat, slow down the production of internal body heat, and provide greater blood flow to the skin.

Workers employed outdoors are especially subject to weather changes. A hot spell or a rise in humidity can create overly stressful conditions. The following practices can help to reduce heat stress:

Postponement of nonessential tasks,

Permit only those workers acclimatized to heat to perform the more strenuous tasks, or

Provide additional workers to perform the tasks keeping in mind that all workers should have the physical capacity to perform the task and that they should be accustomed to the heat.

Thermal Conditions in the Workplace

A variety of engineering controls can be introduced to minimize exposure to heat. For instance, improving the insulation on a furnace wall can reduce its surface temperature and the temperature of the area around it. In a laundry room, exhaust hoods installed over those sources releasing moisture will lower the humidity in the work area. In general the simplest and least expensive methods of reducing heat and humidity can be accomplished by:

Opening windows in hot work areas,

Using fans, or

Using other methods of creating airflow such as exhaust ventilation or air blowers.

Rest Areas

Providing cool rest areas in hot work environments considerably reduces the stress of working in those environments. There is no conclusive information available on the ideal temperature for a rest area. However, a rest area with a temperature near 76/F appears to be adequate and may even feel chilly to a hot, sweating worker, until acclimated to the cooler environment. The rest area should be as close to the workplace as possible. Individual work periods should not be lengthened in favor of prolonged rest periods. Shorter but frequent work-rest cycles are the greatest benefit to the worker.

Drinking Water

In the course of a day's work in the heat, a worker may produce as much as 2 to 3 gallons of sweat. Because so many heat disorders involve excessive dehydration of the body, it is essential that water intake during the workday be about equal to the amount of sweat produced. Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst drive. A worker, therefore, should not depend on thirst to signal when and how much to drink. Instead, the worker should drink 5 to 7 ounces of fluids every 15 to 20 minutes to replenish the necessary fluids in the body. There is no optimum temperature of drinking water, but most people tend not to drink warm or very cold fluids as readily as they will cool ones. Whatever the temperature of the water, it must be palatable and readily available to the worker. Individual drinking cups should be provided--never use a common drinking cup.

Heat acclimatized workers lose much less salt in their sweat than do workers who are not adjusted to the heat. The average American diet contains sufficient salt for acclimatized workers even when sweat production is high. If, for some reason, salt replacement is required, the best way to compensate for the loss is to add a little extra salt to the food. Salt tablets *should not* be used.

Protective Clothing

Clothing inhibits the transfer of heat between the body and the surrounding environment. Therefore, in hot jobs where the air temperature is lower than skin temperature, wearing clothing reduces the body's ability to lose heat into the air.

When air temperature is higher than skin temperature, clothing helps to prevent the transfer of heat from the air to the body. However, this advantage may be nullified if the clothes interfere with the evaporation of sweat.

In dry climates, adequate evaporation of sweat is seldom a problem. In a dry work environment with very high air temperatures, protective clothing could be an advantage to the worker. The proper type of clothing depends on the specific circumstance. Certain work in hot environments may require insulated gloves, insulated suits, reflective clothing, or infrared reflecting face shields.

5.7.1 For extremely hot conditions, thermally conditioned clothing is available. One such garment carries a self-contained air conditioner in a backpack, while another is connected a compressed air source which feeds cool air into the jacket or coveralls through a vortex tube. Another type of garment is a plastic jacket which has pockets that can be filled with dry ice or containers of ice.

Use of PPE and Thermal Stress

PPE retains heat and in some cases can cause a dramatic increase in heat contained in the suit.

All Respirators regardless of type increase heat retention. Self contained breathing apparatus (SCBA) and or powered air purifying respirators (PAPR) have a stream of fresh air coming through the respirator, however, they still increase heat retention.

Tyvek the white coveralls with booties and hoods increase heat retention to a degree but air can pass through the material therefore some cooling takes place.

Sarnex coated Tyvek or similar chemical resisting clothing does not allow for evaporation and therefore will significantly increase heat retention. These suits if used in the sun also collect radiant heat which causes a greenhouse effect by trapping the heat from the sun inside the suit.

Level A or Level B fully encapsulating suits are the most heat retentive of all PPE. They prevent evaporation and heat levels in the suit on a hot sunny day in Arizona can reach over 135^{o} F.

5.6.1. Working outside, especially in the Southwest, in PPE requires short periods of time working in the protective clothing followed by a longer period in an air conditioned area drinking water. This is a resting period. A person who comes in from wearing PPE in the sun cannot go to another job working in a cool environment. The person must first rest and replenish fluids. For example, the regime for working in fully encapsulated Level B suits on a day where temperatures are 95^{o} F or higher will be 15 minutes work, followed by 45 minutes in the air conditioned room drinking water. This is done because the water loss in 15 minutes at 130^{o} F plus is very significant.

Studies have shown that core body temperatures start to climb under extreme heat exposure as with wearing fully encapsulated suits. Many workers after September 11 working at the World Trade Center were treated for heat related illnesses due to working too long in PPE with inadequate breaks. In some cases core temperatures were measured at 104 to 105^{o} F.

SPECIAL CONSIDERATIONS DURING PROLONGED HEAT SPELLS

During unusually hot weather conditions lasting longer than 2 days, the number of heat illnesses usually increases. This is due to several factors, such as progressive body fluid deficit, loss of appetite (and possible salt deficit), buildup of heat in living and work areas, and breakdown of air-conditioning equipment. Therefore, it is advisable to make a special effort to adhere rigorously to the above preventive measures during these

extended hot spells and to avoid any unnecessary or unusual stressful activity. Sufficient sleep and good nutrition are important for maintaining a high level of heat tolerance. Workers who may be at a greater risk of heat illnesses are the obese, the chronically ill, and older individuals.

When feasible, the most stressful tasks should be performed during the cooler parts of the day (early morning or at night). Double shifts and overtime should be avoided whenever possible. Rest periods should be extended to alleviate the increase in the body heat load.

The consumption of alcoholic beverages during prolonged periods of heat can cause additional dehydration. Persons taking certain medications (e.g., medications for blood pressure control, diuretics, or water pills) should consult their physicians in order to determine if any side effects could occur during excessive heat exposure. Daily fluid intake must be sufficient to prevent significant weight loss during the workday and over the workweek.

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APPENDIX G

WET BULB GLOBE TEMPERATURES AND HEAT INDEX GUIDELINES/CHART

(Information compiled by ADHS Industrial Hygienist and Safety Officer Don Kautz)

MEASUREMENT OF WET BULB GLOBE TEMPERATURE.

Measurement is often required of those environmental factors that most nearly correlate with deep body temperature and other physiological responses to heat. At the present time, the Wet Bulb Globe Temperature Index (WBGT) is the most used technique to measure these environmental factors. WBGT values are calculated by the following equations:

Indoor or Outdoor Wet Bulb Globe Temperature Indexes (WBGI) Indoor or outdoors with no solar load

$$WBGT = 0.7NWB + 0.3GT$$

Outdoors with solar load

$$WBGT = 0.7NWB + 0.2GT + 0.1DB$$

where:
- WBGT = Wet Bulb Globe Temperature Index
- NWB = Natural Wet-Bulb Temperature
- DB = Dry-Bulb (air) Temperature
- GT = Globe Thermometer Temperature

The determination of WBGT requires the use of a black globe thermometer, a natural (static) wet-bulb thermometer, and a dry-bulb thermometer. The measurement of environmental factors shall be performed as follows:

1. The range of the dry and the natural wet-bulb thermometers should be -5°C to +50°C, with an accuracy of ±0.5°C. The dry bulb thermometer must be shielded from the sun and the other radiant surfaces of the environment without restricting the airflow around the bulb. The wick of the natural wet bulb thermometer should be kept wet with distilled water for at least one-half hour before the temperature reading is made. It is not enough to immerse the other end of the wick into a reservoir of distilled water and wait until the whole wick becomes wet by capillarity. The wick must be wetted by direct application of water from a syringe one-half hour before each reading. The wick must cover the bulb of the thermometer and an equal length of additional wick must cover the stem above the bulb. The wick should always be clean, and new wicks should be washed before using.

2. A globe thermometer, consisting of a 15 cm (6-inch) in diameter hollow copper sphere painted on the outside with a matte black finish, or equivalent, must be used. The bulb or sensor of a thermometer (range -5°C to +100°C with an accuracy of ±0.5°C) must be fixed in the center of the sphere. The globe thermometer should be exposed at least 25 minutes before it is read.

3. A stand should be used to suspend the three thermometers so that they do not restrict free air flow around the bulbs and the wet-bulb and globe thermometer are not shaded.

4. It is permissible to use any other type of temperature sensor that gives a reading similar to that of a mercury thermometer under the same conditions.

5. The thermometers must be placed so that the readings are representative of the employee's work or rest areas, as appropriate.

Once the WBGT has been estimated, employers can estimate workers' metabolic heat load and use the ACGIH method to determine the appropriate work/rest regimen, clothing, and equipment to use to control the heat exposures of workers in their facilities.

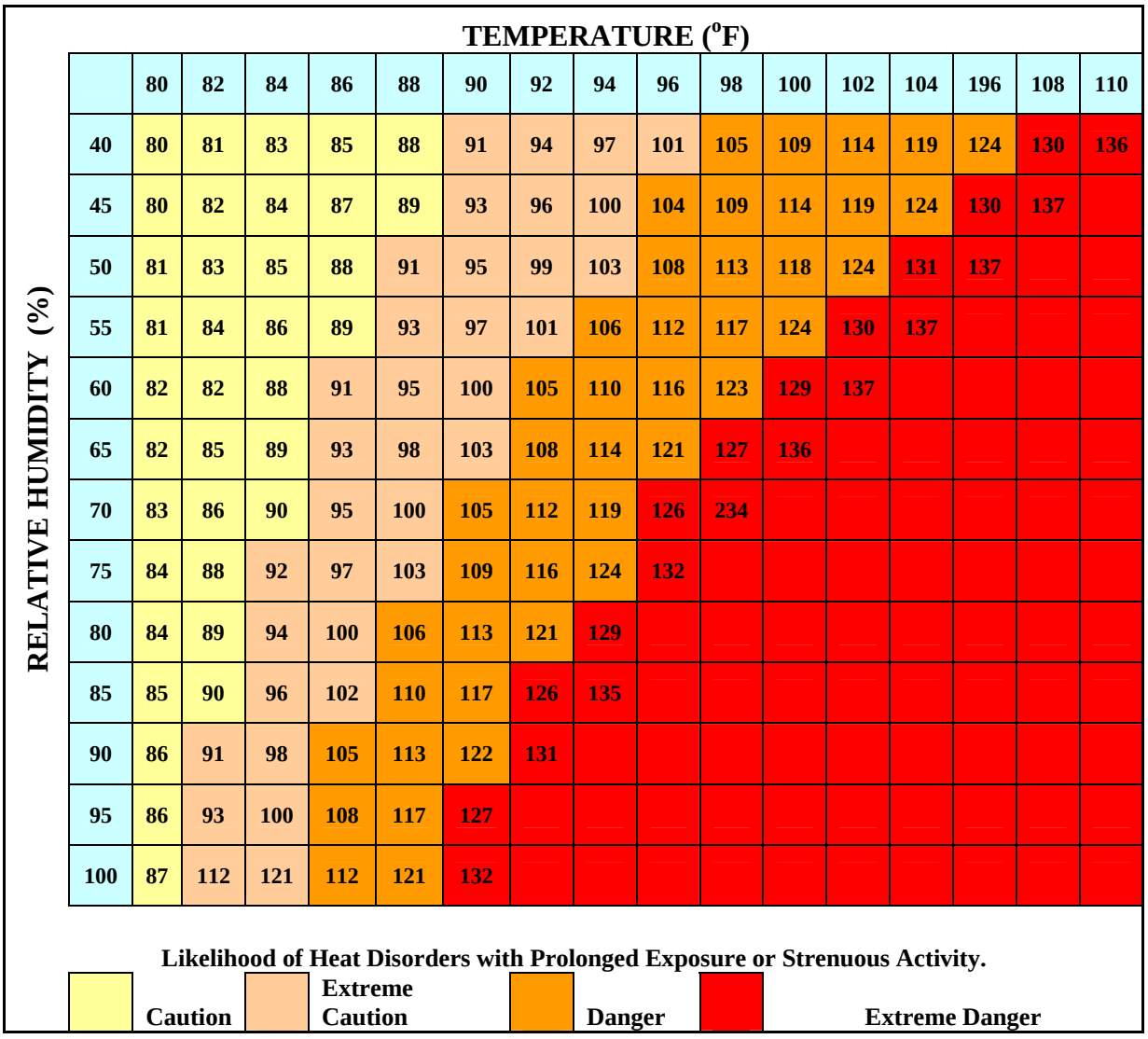
HEAT INDEX

The heat index (see chart below) is the "feels like", or apparent, temperature. As relative humidity increases, the air seems warmer than it actually is because the body is less able to cool itself via evaporation of perspiration.

As the heat index rises, so do health risks. When the heat index is 90°-105°F, heat exhaustion is possible. When it is above 105°F, it is probable. Heatstroke is possible when the heat index is above 105°F, and very likely when it is 130°F and above. Physical activity and prolonged exposure to the heat increase the risks.

NOTE: The heat index chart is designed with street clothes in mind. People wearing PPE will notice an increase in temperature inside the suits as the PPE level increases. Chemical resistant suits do not “breathe” and therefore trap heat inside. Temperature inside a chemical suit or encapsulated suit, in the sun, will equal globe temperatures and may exceed 140 ^{o}F.

Table1.
National Oceanographic and Atmospheric Administration (NOAA)
Heat Index Chart



RELATIVE HUMIDITY (%)	TEMPERATURE (°F)															
	80	82	84	86	88	90	92	94	96	98	100	102	104	196	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	82	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	127	136					
70	83	86	90	95	100	105	112	119	126	234						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	112	121	112	121	132										

APPENDIX H
Other Resources

Arizona Department of Health Services
Office of Environmental Health
Protecting Yourself from Arizona's Heat
http://azdhs.gov/phs/oeh/protect_from_heat.htm

National Institute for Occupational Safety and Health (NIOSH)
Safety and Health Topic: Heat Stress
http://www.cdc.gov/niosh/topics/heatstress/